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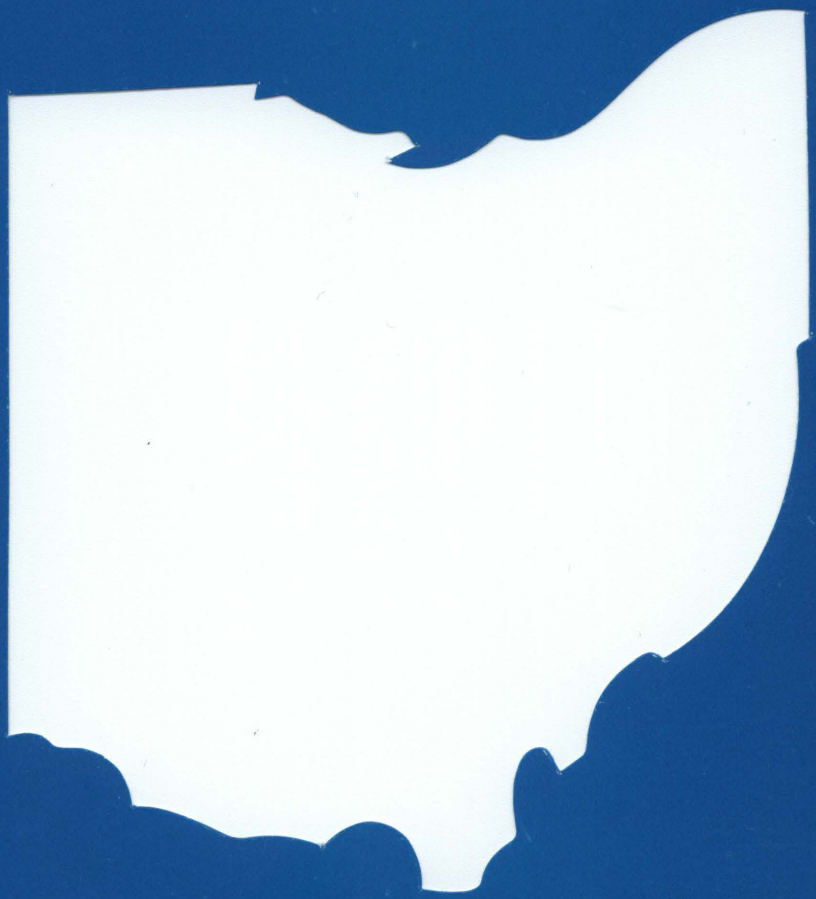

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Sewage Treatment Facilities in Ohio's Small Communities: Present and Future Needs

by

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The communities of Ohio, both large and small, are experiencing an increase in demand for sewage disposal services. This increase in demand results, in part, from a growth in total population and a shift of the population from the rural to urban areas. Another factor influencing the demand for sewage services is the enactment of legislation designed to enhance the quality of the environment.[1/] Recent law stipulates that sewage treatment facilities must meet certain criteria, with respect to effluent being discharged into receiving waters. In view of these demand pressures, communities are reassessing their respective sewage disposal practices as well as searching for the most economically feasible methods for supplying sewage services.

This publication provides an overview of the sewage treatment facilities currently employed by small communities in Ohio. Small communities are here defined as incorporated communities having populations of ten thousand or less. Information presented in this paper will aid local government in assessing and evaluating both current and future sewage service needs. It is recognized that a considerable part of the sewage planning process for local governments in Ohio involves unincorporated villages, trailer parks, and rural subdivisions

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1/ Federal Water Pollution Control Act Amendments of 1972, Public Law 92-500, 92nd Congress, S. 2770, October, 1972.

which may or may not have community treatment systems. However, this report is confined to the small incorporated communities as a part of an overall study of sewage service in communities of Ohio.[2/] Future updating and expansion of this overview is forthcoming.

Population of Communities in Ohio

Census data reveal that in 1970 Ohio had a total population of 10,652,017 people. Approximately 74 percent of the total population resided in incorporated and unincorporated communities. These communities had populations ranging from 750,093 to 43 people. A breakdown of the communities in Ohio by size and population is given in Table 1.

Communities with populations of 10,000 or less account for 829 of the total number of communities in Ohio. These smaller communities contain 1,547,981 people or 19.7 percent of the population living in incorporated or unincorporated places throughout Ohio. Unincorporated communities accounted for 35 of these communities with a total population of 116,708.

A substantial proportion of the population located outside of the incorporated and unincorporated communities reside in housing developments, mobile home parks, and multifamily apartment complexes. Although information on these communities is limited, they should also be considered as part of the small community "scene."

Sewage Treatment in Small Communities

The number of small incorporated communities with central sewage treatment facilities and the population being served by these systems is

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2/ Project number Hatch 434, Ohio Agricultural Research and Development Center, Wooster, Ohio.

Table 1. Population of Incorporated and Unincorporated Communities in Ohio: 1970.

Community Size	Number	Population
1,000,000 or more	-	-
500,000 to 1,000,000	2	1,290,580
250,000 to 500,000	3	1,111,767
100,000 to 250,000	4	593,658
50,000 to 100,000	11	725,769
25,000 to 50,000	30	1,015,014
10,000 to 25,000	103	1,563,634
5,000 to 10,000	96	658,201
2,500 to 5,000	105	366,195
2,000 to 2,500	44	98,107
1,500 to 2,000	63	108,022
1,000 to 1,500	93	111,880
500 to 1,000	179	131,604
200 to 500	195	66,186
Less than 200	54	7,786
TOTALS	982	7,848,403

SOURCE: U.S. Bureau of Census, 1970 Census of Population, Number of Inhabitants: Ohio, PC(1)-A37, (Washington: U.S. Government Printing Office, 1971), p. 37-10.

outlined in Appendix A.

A total of 364 or 43 percent of the small incorporated communities in Ohio provide some type of central sewage treatment services. Assuming that the population in these small communities increased from 1970-1972 at the same rate as for the 1960-1970 period, approximately 80 percent of residents in the small communities of Ohio have access to central sewage treatment facilities. A number of counties have populations served exceeding the total population of the county which can be attributed to

a growth in population and community size and the expansion of services to residences outside the boundaries of the community.

Sewage treatment services are often classified by type of treatment. Treatment classification refers to the degree of sewage treatment and to the quality of sewage effluent being discharged into receiving waters. The quality of sewage effluent is measured by its suspended solids content and BOD level.3/

The basic types of sewage treatment are classified as either primary, secondary, or tertiary. Primary treatment is the most basic form of sewage treatment in which settling of raw sewage occurs. Efficient primary systems are capable of removing up to 60 percent of the suspended solids and reducing the BOD level by at least 35 percent. Secondary treatment is achieved by the use of a biological process following primary treatment. During the biological process, organic matter is decomposed and stabilized, reducing both the BOD level and suspended solids. Secondary treatment systems often achieve an 80-90 percent reduction in both the BOD level and suspended solids.

However, plant nutrients such as nitrogen and phosphorous, which are major sources of water pollution, generally remain unaltered through primary and secondary treatment. The most advanced degree of sewage treatment, achieving the highest quality effluent, is achieved by tertiary treatment systems. These processes are designed to further reduce the BOD and suspended solids in secondary effluent. Removal of plant nutrients is accomplished by advanced tertiary processes such as ammonia

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3/ Biochemical Oxygen Demand. A measure of the amount of oxygen required to oxidize all organic matter in a given quantity of sewage or polluted water.

stripping and carbon absorption, etc. The final step in all types of sewage treatment is chlorination of treated effluent, which kills any pathogens that have survived the treatment process.

A description of the types of sewage treatment employed by the small communities in Ohio is shown in Table 2. The data do not include an estimated 218 treatment systems operated by counties, sewer districts, and private individuals. These facilities provide sewage services to residential developments such as housing subdivisions and mobile home parks.

Information in Table 2 indicates that 295 communities operate their own sewage treatment facilities, while the remaining communities obtain their sewage treatment services from adjacent population centers. Communities which operate their own treatment facilities served 87 percent of the total population. Approximately 83 percent of the population are served by systems achieving at least secondary treatment. The investigation of small community sewage services indicates that, although a large percentage of the population has access to adequate or secondary treatment systems, many communities will need to construct, expand, or upgrade sewage systems in order to provide adequate sewage services under the new legislation.

Environmental Quality Requirements and Sewage Treatment in Small Communities

The enactment of Public Law 92-500, which is designed to restore and maintain the quality of the Nation's water resources, requires communities to take a closer look at their sewage treatment practices. The law states, in part, that all publicly owned treatment works must

Table 2. Small Communities in Ohio Having Central Sewage Treatment Systems, by Treatment Type: 1972.

Type Treatment	Number of Communities Served	Population Served	Percent of Population Served
Primary	51	143,236	12.8
Primary (Share)[a/]	4	24,275	2.2
Intermediate	2	11,196	1.0
Intermediate (Share)	4	15,985	1.4
Secondary	219	630,583	56.5
Secondary (Share)	51	198,804	17.8
Tertiary[b/]	25	83,305	7.5
Tertiary (Share)	3	8,566	.8
TOTALS	359[c/]	1,115,950	100.0

a/ Community receives sewage services from another community.

b/ Plants or systems which further reduce the BOD and suspended solids in secondary sewage effluent.

c/ Does not include secondary treatment facilities for five communities for which population could not be obtained.

SOURCE: 1972 Inventory of Municipal Waste Treatment Facilities in Ohio, Ohio Environmental Protection Agency.

employ some type of secondary sewage treatment by 1977. As shown in Table 2, there are 61 small communities in Ohio which need to improve their sewage treatment facilities to meed the requirement of secondary treatment.

One of the major goals of the new federal law is to eliminate the discharge of pollutants into navigable waters by 1985. In order to achieve this goal, the law specifies that all publicly owned treatment facilities must provide some form of tertiary treatment to their respective communities by 1983. The implementation of advanced tertiary

treatment systems, which remove the nitrogen and phosphorous compounds from sewage, will increase the quality of water and eliminate a major source of water pollution. As indicated in Table 2, 28 of the small communities in Ohio currently meet this objective. Although the plants in these communities provide some form of tertiary treatment, none have the capability of removing the plant nutrients such as nitrogen and phosphorous, which is required to meet future water quality standards.

The communities which do not have central sewage treatment facilities at the present time will be evaluated in accordance with new water quality standards yet to be formulated in Ohio. Communities contributing excessive amounts of waste materials will be required to adopt measures that comply with the set standards or guidelines.

The Ohio Environmental Protection Agency (OEPA) is responsible for the control, abatement, and elimination of pollutant discharges into the waterways of Ohio. The OEPA has set quality standards requiring all systems to provide secondary treatment by 1977, following the Federal directives. The state standards require that all secondary systems must achieve an 85 percent reduction in both BOD and suspended solids. More stringent standards may be imposed on communities with severe pollution problems or those located in river basins with severe water pollution problems. These state standards, as well as future standards, will serve as guidelines in meeting the overall goals set by the Federal Environmental Protection Agency.

Directions in Financing Sewage Treatment Facilities

One of the principal methods of controlling and abating pollution is by constructing, expanding, or upgrading sewage treatment systems. The

construction of waste treatment systems requires large sums of capital. The Federal Water Pollution Control Act Amendments of 1972 contain a provision for financial assistance in the construction of waste treatment facilities. Communities can now receive a 75 percent grant to cover the cost of municipal treatment works, leaving 25 percent as the local share of financing.4/ In Ohio, these treatment plant conatruction grants are currently allocated to communities based upon the severity of pollution, the degree to which the project will abate pollution, and the extent of project regionalization.

In the past, the majority of the federal funds have been awarded to the larger cities of Ohio. For example, Ohio received $115 million in federal funds for the fiscal year 1973, which were used to fund twenty-one projects throughout the state. Of this amount, $1.2 million was awarded to four projects involving small communities. This trend is likely to continue since the larger cities and river basins with severe pollution problems have generally been given higher priority for the limited federal funds. The Lake Erie basin has been given highest priority as a result of severe pollution problems and an international agreement designed to increase the quality of these waters.

Many small communities which have inadequate or insufficient sewage treatment services also have limited financial resources available for provision of these services. Sewage services also compete with other community services for financial resources in the budgets of local governments. Since local and federal funds are limited, communities

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4/ For additional information see Construction Grants for Water Pollution Control: Procedures for Application, Division of Intergovernmental Administration, Ohio Environmental Protection Agency, Columbus, Ohio.

must take a closer look at the costs associated with providing adequate sewage services as well as alternative ways to supply water of high quality.

A forthcoming study will document the costs of collecting and treating sewage in the small residential communities of Ohio. Cost estimates from this study, based on actual cost data, will provide useful information to communities searching for the most economically feasible method of delivering the sewage services.

Summary

Small communities in Ohio are faced with the problem of an increasing demand for sewage treatment services due to growing populations and recently imposed water quality requirements. Many small communities will have to decide whether to upgrade primary or secondary systems or to construct new secondary and/or tertiary treatment facilities in order to supply these services. These problems are critical since communities face financial problems in supplying sewage services as 1) such facilities require large amounts of capital, 2) small communities have a declining financial base with which to allocate funds to sewage treatment, and 3) small communities do not have favorable priority in receiving matching federal and state grants. Since small communities are confronted with the problem of providing sewage treatment services with limited financial resources, increased emphasis must be placed on evaluating alternative methods of providing these services and the commensurate financing, not only at the local level but also at the state and federal level.

Appendix A

Small Communities in Ohio Having Central Sewage Treatment Systems, by County: 1972.

County	Number of Communities		Population Total 1970	Population Served 1972
	Total	Served		
Adams	7	5	7,667	6,842
Allen	9	4	19,562	13,950
Ashland	8	2	6,087	3,527
Ashtabula	7	5	15,131	11,636
Athens	9	2	11,595	6,024
Auglaize	9	6	22,844	23,209
Belmont	12	9	33,781	41,210
Brown	10	6	10,901	8,396
Butler	7	2	13,919	5,701
Carroll	5	1	5,057	2,800
Champaign	6	2	5,354	3,284
Clark	9	2	12,289	7,287
Clermont	12	5	17,039	14,213
Clinton	7	2	7,874	5,563
Columbiana	11	7	26,421	24,208
Coshocton	5	1	3,215	1,700
Crawford	5	1	8,076	6,417
Cuyahoga	26	18	86,247	56,249
Darke	17	4	11,571	7,282
Defiance	3	1	4,623	3,471
Delaware	6	1	5,108	1,813
Erie	7	3	21,019	17,066
Fairfield	13	4	10,113	5,199
Fayette	4	0	2,229	0
Franklin	17	8	31,523	26,274
Fulton	7	5	15,849	14,163
Gallia	7	2	9,612	9,374
Geauga	5	4	9,993	7,854
Greene	7	3	11,265	8,938
Guernsey	10	2	5,319	2,600
Hamilton	29	26	139,376	122,630
Hancock	10	1	5,794	1,334
Hardin	9	4	19,183	14,790
Harrison	9	1	7,734	3,379
Henry	9	3	14,482	10,423
Highland	7	2	13,420	11,512
Hocking	3	1	7,455	6,763
Holmes	5	2	4,771	4,328
Huron	7	5	20,740	20,483
Jackson	4	3	14,445	14,329
Jefferson	19	9	33,353	27,540
Knox	6	4	5,975	5,368

Appendix A (Continued)

County	Number of Communities Total	Served	Population Total 1970	Population Served 1972
Lake	12	4	27,171	17,806
Lawrence	6	2	7,812	3,732
Licking	12	6	22,310	20,908
Logan	10	4	8,524	4,416
Lorain	11	7	46,799	46,742
Lucas	6	3	10,392	8,666
Madison	6	4	14,668	14,296
Mahoning	7	7	18,920	18,451
Marion	7	0	4,450	0
Medina	7	4	6,455	5,315
Meigs	5	2	7,386	6,692
Mercer	9	5	16,680	14,693
Miami	10	5	16,535	14,896
Monroe	10	1	5,058	3,721
Montgomery	11	9	39,089	32,759
Morgan	4	2	3,956	4,450
Morrow	7	1	6,454	3,000
Muskingum	9	5	9,389	7,900
Noble	6	1	3,288	2,100
Ottawa	8	4	15,080	13,984
Paulding	10	2	8,661	4,579
Perry	11	4	13,734	7,000
Pickaway	8	1	5,309	1,800
Pike	3	2	6,522	6,250
Portage	8	5	22,845	9,337
Preble	11	5	15,190	12,427
Putnam	15	7	14,775	11,046
Richland	8	8	23,482	18,542
Ross	6	3	4,284	2,521
Sandusky	6	3	11,093	8,117
Scioto	4	1	4,559	4,486
Seneca	6	3	5,046	3,290
Shelby	8	3	5,042	2,982
Stark	15	8	25,661	20,625
Summit	14	7	44,244	24,803
Trumbull	7	4	20,624	20,625
Tuscarawas	17	7	24,360	19,953
Union	5	2	9,173	7,796
Van Wert	8	2	3,875	1,843
Vinton	4	1	2,981	1,569
Warren	12	5	27,961	17,772
Washington	6	4	10,749	10,496
Wayne	14	10	25,748	18,374
Williams	9	4	18,488	15,195

Appendix A (Continued)

County	Number of Communities Total	Number of Communities Served	Population Total 1970	Population Served 1972
Wood	24	7	36,213	21,299
Wyandot	8	2	12,227	9,340
TOTALS	794	364	1,431,273	1,115,950

SOURCES: 1) 1972 Inventory Municipal Waste Treatment Facilities in Ohio, Ohio Environmental Protection Agency.

2) Reference Tables: Population Change of Counties and Incorporated Places in Ohio, 1950-1970, ESO No. 80. Department of Agricultural Economics and Rural Sociology, The Ohio Agricultural Research and Development Center and The Ohio State Univerasity.

3) Original survey data. Project Number Hatch 434, The Ohio Agricultural Research and Development Center, 1973.